ANNUAL REPORT FOR 2002

Huskanaw Swamp Mitigation Site
Martin County
Project No. 6.099008T
TIP No. R-2111 WM

Office of Natural Environment & Roadside Environmental Unit
North Carolina Department of Transportation
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Summary

The following report summarizes the monitoring activities at the Huskanaw Swamp Mitigation Site. This site was constructed in 1996 to provide wetland mitigation for the relocation of US 64. The site is monitored using three hydrologic monitoring gauges and eight vegetation plots. The year 2002 reflects the fifth complete year that monitoring has taken place on the site.

During the 2002 monitoring season all of the three monitoring gauges showed saturation for more than 12.5% of the growing season, with HS-1 showing saturation for 25.4% of the season, HS-3 showing saturation for 15.6%, and HS-4 showing 15.2% of the growing season. This is the fifth consecutive year in which all groundwater gauges located on the site have met the minimum hydrologic success criteria of 8% for "transitional areas" as defined in the mitigation plan, dated October, 1994.

The vegetation plots yielded an average plot density of 556 trees per acre. All of the plots exceed the typical fifth year standard of 260 trees per acre. This is the fifth consecutive year in which average plot density has exceeded the minimum criteria for success.

The daily rainfall data depicted on the monitoring gauge graphs is recorded from an on-site rain gauge that was installed on May 23, 2000. Historical rainfall data used for the 30-70 percentile was recorded at the Williamston rain gauge, maintained by the NC State Climate Office. All three monitoring gauges showed saturation for more than 12.5% of the growing season during months of normal or below normal rainfall in 2002.

Based on the hydrologic and vegetation success observed over the past four years, the NCDOT believes that this site has met its design objective to restore both wet hardwood forest and swamp forest wetland communities. The NCDOT recommends that all monitoring activities be discontinued at this site.

1.0 Introduction

1.1 PROJECT DESCRIPTION

The Huskanaw Swamp Mitigation Site is located in north central Martin County and encompasses approximately 112 acres. It is approximately 0.95 miles west of the US 64 - US 64 Business Interchange, along SR 1405 (Figure 1). The site was originally constructed in the winter of 1996-97. However, planting activities were not completed until February 1998.

The site serves as mitigation for the US 64 relocation and consists of restoration, enhancement, and preservation. The site is designed to restore both wet hardwood forest and swamp forest wetland communities. An additional area preserves approximately 33 acres of swamp/bottomland forest wetlands.

1.2 PURPOSE

In order to demonstrate successful mitigation, hydrologic and vegetative monitoring must be conducted for a minimum of three years. Success criteria are based on federal guidelines for wetland mitigation. These guidelines stipulate criteria for both hydrologic conditions and vegetation survival. The following report details the results of hydrologic and vegetation monitoring during the 2002 growing season at the Huskanaw Swamp Mitigation Site. Included in this report are analyses of both hydrologic and vegetative monitoring results as well as local climate conditions throughout the growing season and site photographs.

1.3 PROJECT HISTORY

Winter 1996-97	Site Constructed
April 1997	Monitoring Gauges Installed
April- November 1997	Hydrologic Monitoring
February 1998	Site Planted
March- November 1998	Hydrologic Monitoring (1 yr.)
October 1998	Vegetation Monitoring (1 yr.)
March- November 1999	Hydrologic Monitoring (2 yr.)
October 1999	Vegetation Monitoring (2 yr.)
March- November 2000	Hydrologic Monitoring (3 yr.)
September 2000	Vegetation Monitoring (3 yr.)
May 2001	On-site Agency Meeting
March- November 2001	Hydrologic Monitoring (4 yr.)
July 2001	Vegetation Monitoring (4 yr.)
March- November 2002	Hydrologic Monitoring (5 yr.)
June 2002	Vegetation Monitoring (5 yr.)

Figure 1. Site Location Map

1.4 DEBIT LEDGER

Table 1. Huskanaw Swamp Mitigation Site Debit Ledger

Site Habitat	Mitigation Plan			Ratios	TIP Debit					
	Acres at Start	Acres Remaining	Percent Remaining		R-2112B	R-2112 Bmod	R-2112 BA&BBmod	R-2112 Bmod	R-218A	R-218B
BLH Restoration	3.00	0.00	0.00	--		3.00				
SPH Restoration	1.00	0.00	0.00	--						1.00
BLH Enhancement	50.00	23.60	47.20	3.5:1			4.01	9.07	12.32	1.00
SPH Preservation	33.00	0.00	0.00	--	33.00					
Upland Mgmnt	33.00	N/A	--	--						
Total	120.00	23.60	19.67							

SPH: Swamp Hardwood BLH: Bottomland Hardwood

2.0 Hydrology

2.1 SUCCESS CRITERIA

In accordance with federal guidelines for wetland mitigation and the wetland mitigation plan (entitled "North Carolina Department of Transportation (NCDOT) US 64 Wetland Restoration and Conservation Management Plan, Edgecombe and Martin Counties", dated October 1994) the success criteria for hydrology states that the area must be inundated or saturated (within 12" of the surface) by surface or ground water for at least a consecutive 12.5% of the growing season. This success criteria was agreed upon as part of the special conditions set forth by the Corps of Engineers (COE) through their issuance of permits for NCDOT's TIP projects R-2112 and R-218A (Action ID Numbers 199400663 and 199501132). Also included in the success criteria, is the following: areas inundated less than 5% of the growing season are always classified as non-wetlands, while zones inundated between 5% - 12.5% of the growing season can be classified as wetlands based on factors such as the presence of hydrophytic vegetation and hydric soils.

The growing season in Martin County begins March 16 and ends November 14. The dates correspond to a 50% probability that temperatures will remain above 28^{o} F or higher after March 16 and before November 14.[1] The growing season is 244 days; therefore, the minimum duration for 12.5% of the growing season to have wetland hydrology is 31 consecutive days.

2.2 HYDROLOGIC DESCRIPTION

Three monitoring gauges were installed on site in April of 1997 (Figure 2). Rainfall is the primary hydrologic input for the Huskanaw site. The automatic monitoring gauges record daily readings of the groundwater depth. The 2002 data represents the fifth full growing season for hydrologic monitoring.

2.3 RESULTS OF HYDROLOGIC MONITORING

2.3.1 Site Data

The maximum number of consecutive days that the groundwater was within twelve inches of the surface was determined for each gauge. This number was converted into a percentage of the 244-day growing season (March 16 – November 14). It is this hydrologic data which will determine the hydrologic success of this mitigation site.

There were no problems noted with the monitoring gauge units during the growing season. Table 2 shows the

[1] Soil Conservation Service, Soil Survey of Martin County, North Carolina, p.75.

Figure 2. Huskanaw Swamp Site Gauge Location Map

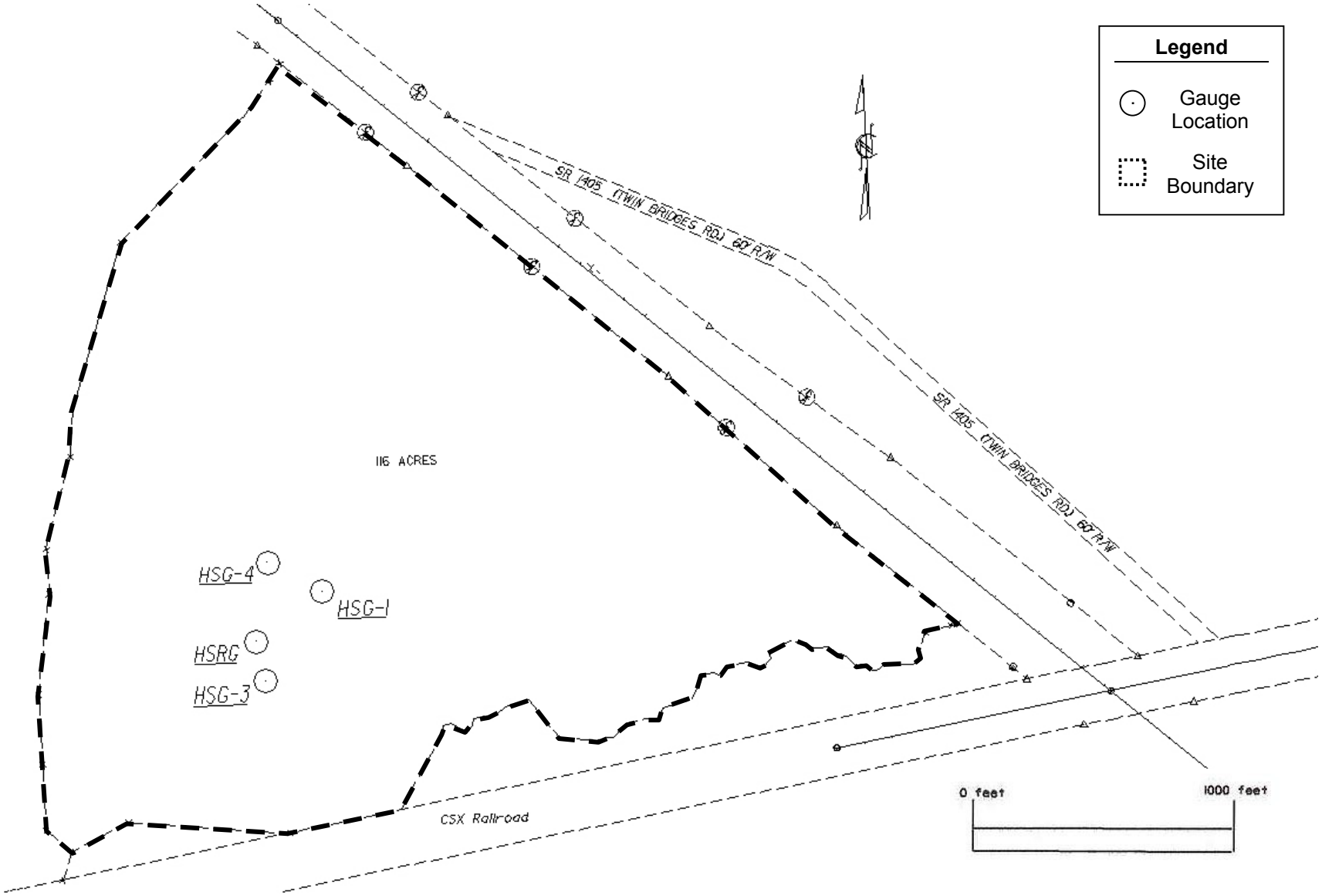


Table 2. 2002 Hydrologic Monitoring Results

Monitoring Gauge	< 5%	5% - 8%	8% - 12.5%	> 12.5%	Number Consecutive Days	Actual %	Success Dates
HS-1				✓	62	25.4	3/16-4/23 7/2-9/1 10/11-11/14
HS-3				✓	38	15.6	3/16-4/22 10/21-11/14
HS-4				✓	37	15.2	3/16-4/21 10/21-11/14

hydrologic results for 2002. HS-1 had two periods with 39 or more consecutive days. (Figure 3 is a graphical representation of the hydrologic monitoring results. See Appendix A for hydrologic Graphs.)

Appendix A contains charts of the groundwater depth for each monitoring gauge during 2002. These monitoring gauge graphs are designed to show the reaction of the groundwater level to specific rainfall events. If the gauge shows saturation for 5% or greater of the growing season, the maximum number of consecutive days is noted on each graph.

A rain gauge was installed during the 2000-growing season. Daily precipitation events, shown on each monitoring gauge graph, represent data from the onsite rain gauge.

2.3.2 Climatic Data

Figure 4 is a comparison of monthly rainfall for the period of November 2001 through October 2002 to historical precipitation (collected between 1971 and 2002) for Williamston, North Carolina. This comparison gives an indication of how 2002 relates to historical data in terms of climate conditions. The NC State Climate Office provided all off-site data.

2002 monthly rainfall for the site fluctuated around the average rainfall for this site. February, May, June, and September experienced below average rainfall. The months of April and August all recorded average rainfall for the site. January, March, and July experienced above average rainfall. No data is available for November or December however; the site meets hydrologic success criteria without these data.

All three monitoring gauges showed saturation for more than 12.5% of the growing season during months of normal or below normal rainfall in 2002.

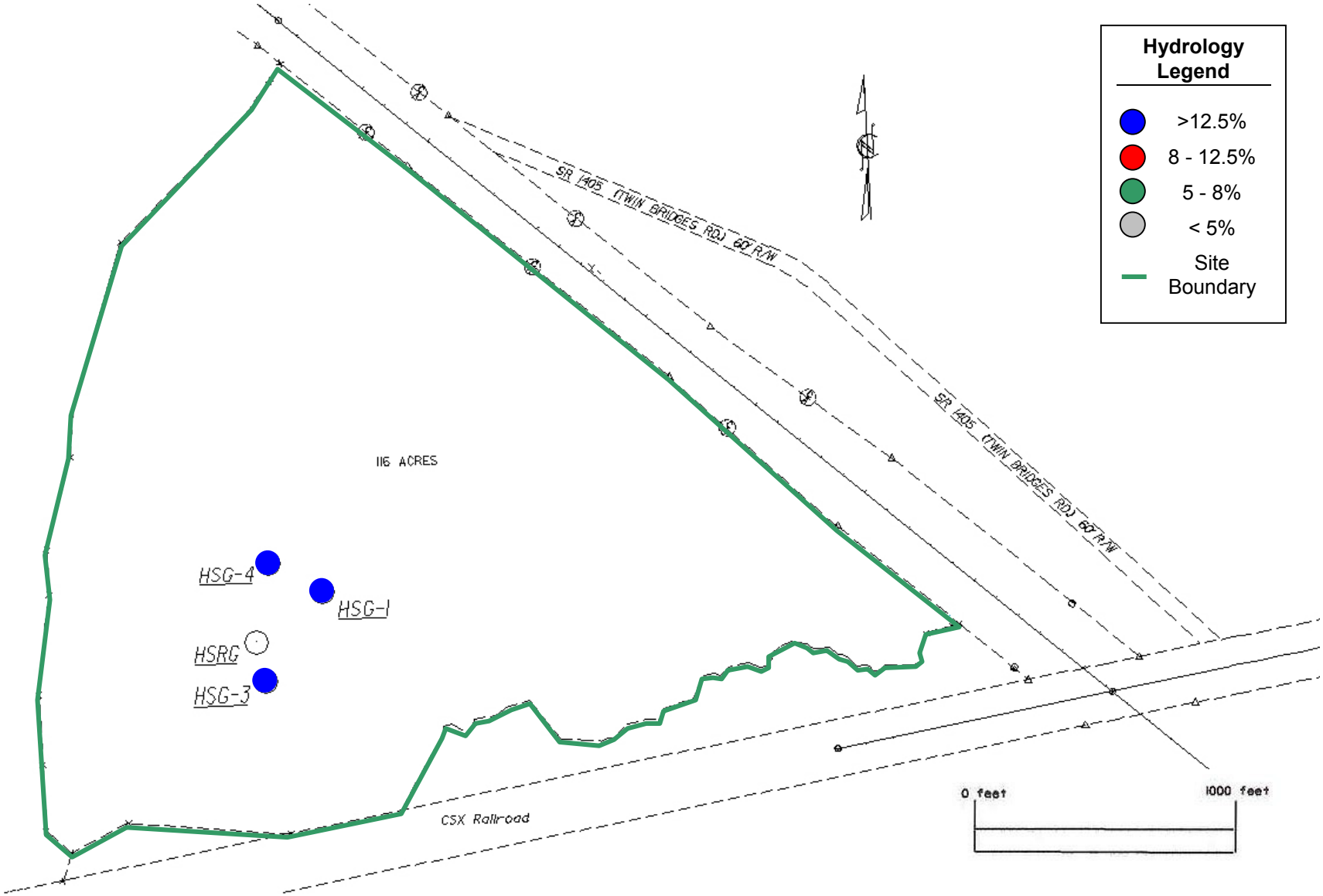
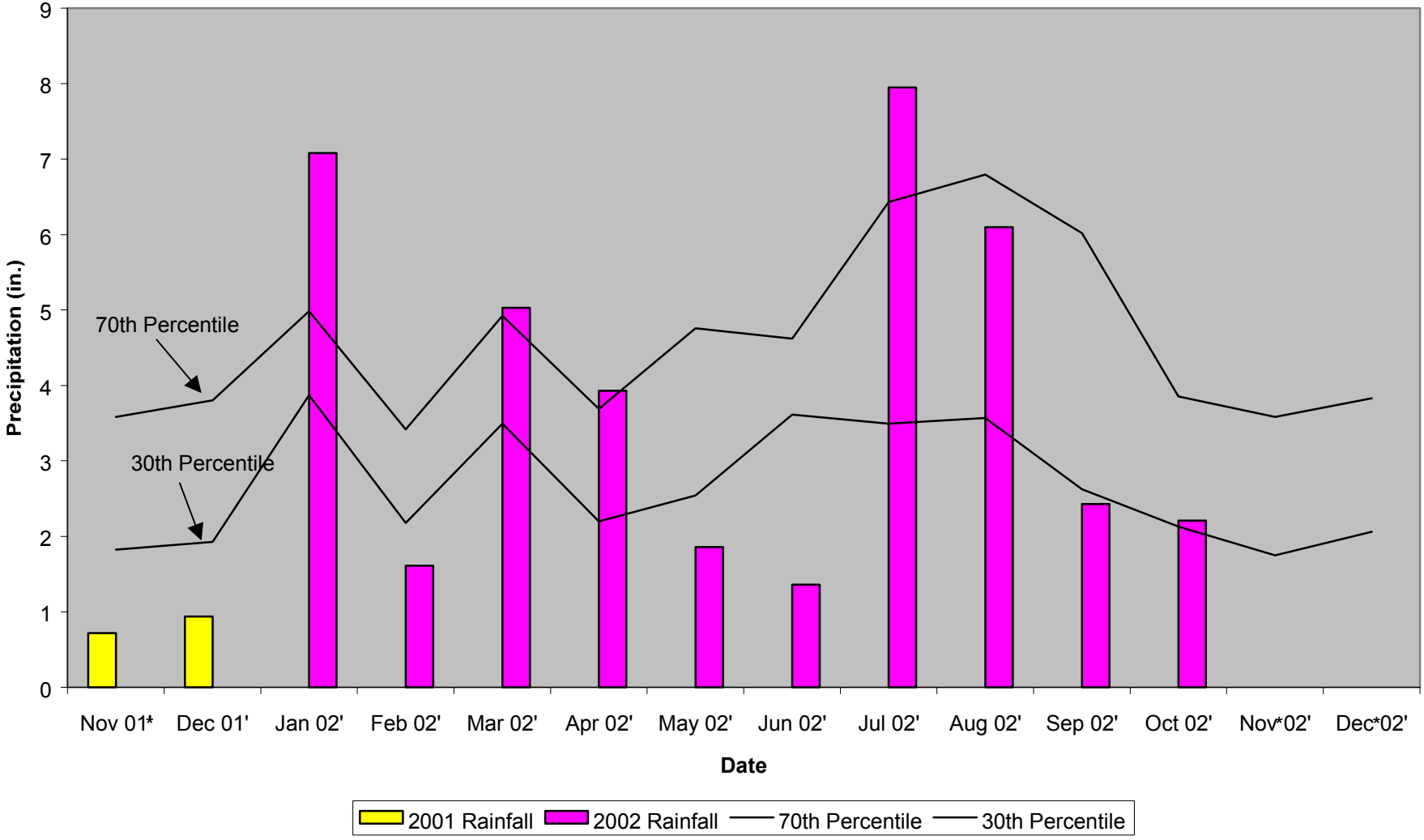


Figure 3. Huskanaw Swamp Site 2002 Hydrologic Monitoring Results

Huskanaw 30-70 Percentile Graph 2002
Williamston, NC



2.4 CONCLUSIONS

In 2002, all of the monitoring gauges recorded saturation within one foot of the surface for at least 12.5% of the growing season, with gauge, HS-1, showing saturation for 16.0% of the season and the other two gauges, HS-3 and HS-4, showing saturation for 13.1% of the growing season. These results are similar to the 1999 results, in which HS-1 recorded saturation for 13.1% of the growing season, while the remaining two gauges recorded saturation for at least 9.4% of the season and the 2000 results in which HS-1 recorded saturation for 21.7% of the season, with the other two gauges, HS-3 and HS-4, showing saturation for 11.5% and 9.4% of the growing season.

All of the gauges met the 12.5% minimum hydrology criteria in 2002 during months with normal to below normal rainfall. This is the fifth consecutive year in which all groundwater gauges located on the site have met the minimum hydrologic success criteria of 8% for “transitional areas” as defined in the mitigation plan, dated October, 1994.

NCDOT proposes to discontinue hydrologic monitoring at the Huskanaw Swamp Mitigation Site.

3.0 VEGETATION: HUSKANAW MITIGATION SITE (YEAR 5 MONITORING)

3.1 Success Criteria

Success Criteria states that there must be a minimum of 320 trees per acre surviving for at least three consecutive years.

3.2 Description of Species

The following tree species were planted on the Site:

Zone 1: Wet Hardwood Forest (56.6 acres)

Fraxinus pennsylvanica, Green Ash
Quercus laurifolia, Laurel Oak
Quercus falcata var. *pagodaefolia*, Cherrybark Oak
Quercus michauxii, Swamp Chestnut Oak
Quercus phellos, Willow Oak
Quercus falcata var. *falcata*, Southern Red Oak
Quercus nigra, Water Oak
Nyssa aquatica, Water Tupelo

Zone 2: Oak/Hickory Forest (19.2 acres)

Quercus alba, White Oak
Quercus nigra, Water Oak
Quercus falcata var. *falcata*, Southern Red Oak
Carya tomentosa, Mockernut Hickory
Carya glabra var. *glabra*, Pignut Hickory
Quercus palustris, Post Oak
Quercus falcata var. *pagodaefolia*, Cherrybark Oak
Quercus phellos, Willow Oak
Quercus michauxii, Swamp Chestnut Oak
Carya cordiformis, Bitternut Hickory

Zone 3: Long Leaf-Oak/Hickory Forest (11.1 acres)

Pinus palustris, Longleaf Pine
Quercus marilandica, Blackjack Oak
Quercus phellos, Willow Oak
Quercus stellata, Post Oak
Carya tomentosa, Mockernut Hickory
Carya glabra var. *glabra*, Pignut Hickory
Quercus michauxii, Swamp Chestnut Oak
Quercus alba, White Oak
Quercus nigra, Water Oak
Quercus falcata var. *falcata*, Southern Red Oak
Carya cordiformis, Bitternut Hickory

3.3 Results of Vegetation Monitoring

ZONE	Plot #	Green Ash	Cherrybark Oak	Swp. Chestnut Oak	Willow Oak	Water Oak	Post Oak	Mockernut Hickory	Bitternut Hickory	Southern Red Oak	Water Tupelo	Blackjack Oak	Longleaf Pine	Laurel Oak	White Oak	Pignut Hickory	Total (5 year)	Total (at planting)	Density (Trees/Acre)
1	1	3	1	1	5	3				1	1			1			16	18	604
	3		1	2	1	2					3						9	21	291
	5	1		2	1	1				2	5						12	18	453
	6	7	16	7	3	1				1							35	42	567
	8	17	6	5	7	1				3							39	42	631
								ZONE 1 AVERAGE DENSITY											**509**
2	4		3	3	6			8	2						5	2	29	34	580
	7		5				7	7	13	6					2		40	40	680
								ZONE 2 AVERAGE DENSITY											**630**
3	2				12		1	2	3	4		10	2				34	36	642
								ZONE 3 AVERAGE DENSITY											**642**
								TOTAL AVERAGE DENSITY											**556**

Site Notes:

Zone 1: Other species noted: broomsedge, *Juncus* sp., blackberry, grapevine, fennel, winged sumac, red maple, sweetgum, tulip poplar, holly, various grasses, trumpet creeper, pine, ragweed, horse-nettle, and giant cane. River birch noted in plot 3.

Zone 2: Other species noted: broomsedge, sicklepod, bermuda grass, fennel, ragweed, red maple, and sweetgum. White oak noted in plots 4 and 7. Swamp white oak and pignut hickory also noted in plot 4.

Zone 3: Other species noted: broomsedge, ragweed, fennel, poplar, *Aster* sp., and bermuda grass. Average tree height is 5 to 7 feet. No red maple or sweetgum noted.

Overall: Broomsedge throughout site. Red maple and sweetgum throughout cut over areas.

3.4 Conclusions

A total of 87 acres on this site involved tree planting. The 2002 vegetation monitoring of the planted areas revealed an average density of 509 trees per acre for Zone 1, 630 trees per acre for Zone 2, and 642 trees per acre for Zone 3. All zones are well above the minimum requirement of 320 trees per acre.

NCDOT proposes to discontinue vegetation monitoring at the Huskanaw Swamp Mitigation Site.

4.0 Overall Conclusions and Recommendations

- One of the three monitoring gauges showed saturation for more than 16.0% of the growing season while the remaining two indicated saturation for 13.1% of the season during normal to below normal rainfall months. This is the fifth consecutive year in which all groundwater gauges located on the site have met the minimal hydrologic success criteria, as stated in the associated permits.

- Vegetation monitoring yielded an average plot density of 556 trees per acre. All of the plots exceed the typical fifth year reduced standard of 290 trees per acre. This is the fifth consecutive year in which average plot density has exceeded the minimal criteria for success, as stated in the associated permit.

- Based on the hydrologic and vegetation success observed over the past five years, the NCDOT proposes to discontinue monitoring of the Huskanaw Mitigation site.

APPENDIX A

DEPTH TO GROUNDWATER CHARTS

APPENDIX B

SITE PHOTOS AND
PHOTO AND PLOT LOCATIONS MAP

HUSKANAW SWAMP


Photo 1


Photo 2


Photo 3


Photo 4

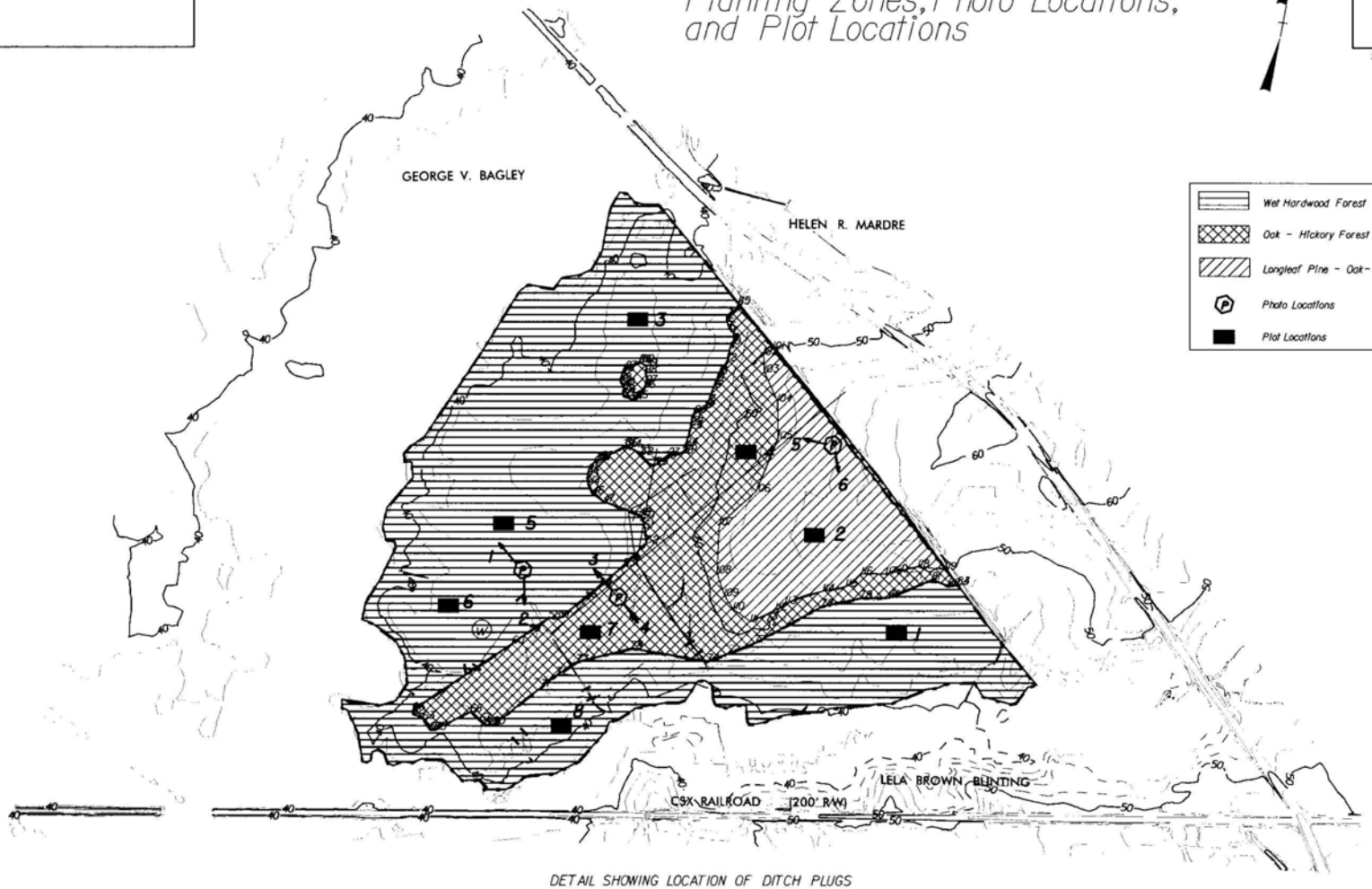

Photo 5


Photo 6

PROJECT REFERENCE NO.	SHEET NO.
R-2112WM	5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

200 100 0 200 400

Huskanaw Wetland Mitigation Site Planting Zones, Photo Locations, and Plot Locations



DETAIL SHOWING LOCATION OF DITCH PLUGS

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION